The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

IN THE MATTER OF THE GAS RESOURCES PRESERVATION ACT

AND IN THE MATTER of a Joint Hearing to determine various questions relating to the proposed Export of Natural Gas from the Province of Alberta.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session: September 19th, 1951.

Volume 7.

I N D E X

VOLUME 7.

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W I T N E S S E S

E X H I B I T S

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JACK F. DOUGHERTY, already sworn, continued cross-examination by Mr. Steer.

Q You were giving us your views, Mr. Dougherty, on this Princess Patricia area?

A That is correct, sir. I believe at the close of the last session I had finished the discussion of the Basal Alberta sand horizon in the Princess field. I would like now to refer to the Sunburst horizon, referring again to Exhibit 4, page 1(b) and Map 27 in Census Division 3. You will note on page 1(b) that we estimate proved, possible and probable reserves in the Sunburst sand. The accumulation of gas in the Sunburst is controlled by a pinch-out of the Sunburst across the southern half of the Princess structure as shown on the map on page 27 in Township 20, Range 12, West of 4 and Township 19, Ranges 12 and 11, West of 4.

The following wells are the control points for the estimation of reserves. There have been completed 6 gas wells and a number of wells drilled through into the oil producing horizon of the Madison and Jefferson limestonesand also demonstrate and prove up the reserves estimated for this horizon in the Princess field. The gas wells are as follows: In Township 19, Range 12, West of 4, Section 34, L.S.D. 10, the National Empire No. 1 well, drillstem test 3278 to 3288 2.8 million cubic feet increasing to 7.7 million cubic feet. Drillstem 3282 to 3288, 1 million cubic feet and 480 feet

of oil, set tubing in packer, well blew in, shut in for the winter months and opened in April 1946 with the initial potential of 8 million cubic feet. Estimated net sand thickness 18 feet. Peerless No. 1 well, Township 20, Range 11, West of 4, Section 18, L.S.D. 4, drillstem tested a total of 1½ million cubic feet between 3170 and 3184.

Q Give us that description again, please?

A Township 20, Range 11, West of 4, Section 18. That well is the easternmost well shown in the Princess limits in Township 20, Range 11. That well was completed as an oil well. The drillstem test proving the gas saturation in the Sunburst. Township 20, Range 12, West of 4, Section 11, L.S.D. 3, Standard McDougall Segur No. 1, drillstem tested 7.8 million cubic feet between 3250 and 3265. We have a core analysis on that particular well. Estimated sand thickness 10 feet. Another gas well completed as the Cal-Standard No. 4 in Township 20, Range 12, West of 4, Section 12, L.S.D. 13, drillstem tested 3140 feet to 3188, 8½ million cubic feet. Open flow test in 1950 showed 10 million cubic feet. Core analysis is available on that well. Estimated net sand thickness, 20 feet.

Q 20 feet?

A 20 feet, yes, sir. The next well of interest in the same Township and the same section, that is Township 20, Range 12, West of 4, Section 12, L.S.D. 15, the Cal-Standard No. 7 well, drillstem tested 7.4 million cubic feet between 3192 and 3240. Pressure approximately 1800 pounds when the well was tested. Net sand estimated 21 feet. Another gas well completed is the well in Section 13 of Township 20, Range 12,

West of 4, L. S. D. 5, Cal-Standard No. 3. This is the discovery test well of the Sunburst sand in the Princess field. Drillstem tested 3151, 1 million cubic feet, drillstem tested 3181, 9 million cubic feet. Produced a small amount of Sunburst oil in 1941, about 5,000 barrels and then cemented back and completed as a gas well in 1947. Estimated net sand 29 feet.

The next well of interest, Cal-Standard No. 5, in Township 20, Range 12, West of 4, Section 14, L.S.D. 9, drillstem tested 5 million cubic feet between 3157 and 3183. The majority of these wells were abandoned because no oil was encountered at the lower horizon and no gas market existed at the time of the drilling of these wells.

Another gas well that was completed for local field use is the Cal-Standard No. 1 in Township 20, Range 12, West of 4, Section 22, L.S.D. 13. Drilled into the Pre-Cambrian at 6155 feet in depth.

Q MR. DAVIS: I do not have the location?

A Section 22 of Township 20, Range 12, West of 4. This well was plugged back and completed as a Sunburst gas well. Drillstem tested 3161 to 3195, 10 million cubic feet. We have core analyses and sample log of this well. Estimated net sand thickness 15 feet. Another test demonstrating gas in the same township and range, Township 20, Range 12, Section 23, Cal-Standard No. 76. Sunburst zone 3145 to 3200 feet was completed as a potential gas well after drilling into the Devonian and failing to find oil saturation. We have no record that the well ever produced but

was completed without perforations ready for market. Another gas well in Township 20, Range 12, West of 4, Section 27, is Cal-Standard No. 6. Drillstem tested 3160 to 3170, 2.4 million; 3170 to 3180, 5.2 million; 3180 to 3190 at 3½ million; 3190 to 3200, 1.3 million. Estimated net sand 16 feet. This was deepened to the Jefferson and produced oil in a lower horizon and was then plugged back as a potential gas well in the Sunburst sand. Those are the basic wells demonstrating the character of the gas saturation in the Princess field in the Sunburst.

Q MR. GOODALL: Were there any wells in there that did not have gas in the Sunburst?

A There are 7 wells unsupported by drillstem tests which from the electrical logs appeared to compare favorably with the wells upon which drillstem tests were taken.

Q On this field, Mr. Dougherty, would you mind telling us what control you had for this probable area down on the southeastern part?

A The probable area down in the southeast is supported by the Empire No. 1 well in Township 19, Range 12, West of 4, Section 27. That was drilled down into the Madison as an oil well and our interpretation was that there were 6 feet of net sand above what appeared to be a good gas-water contact on the electrical log examination.

Q What was that description again?

A Section 27, Township 19, Range 12, West of 4, L.S.D. 1. It is the oil well shown as No. 1 Empire Pacific or Petroleum.

Q Well, I was wondering about this part around there, the tight area, and with regard to those contours in there?

A Our studies in regard to that indicate that the Sunburst occurs along the flank of the Madison high.

Q Yes.

A Now, that area shown centring around the intersection of Townships 20 and 19, Ranges 12 and 11, was the high point on the Madison and the Sunburst is absent. The general history of the Sunburst is that it is developed along the flanks and built up as a detrital of the Madison high.

Q Would it be likely to be on both sides?

A yes, from the control of the wells to the east in Steveville and wells to the west in Patricia. It seemed to us that we had no evidence of the absence of the Sunburst. It would fill the lower portions of the area between the structural highs in the Madison.

Q I was just wondering what evidence you had of the presence of the Sunburst?

A That is exactly why we placed it in the probable category because we have it at the present in the Empire No. 1.

Q As probable or proven in the reserves?

A We still consider it as that. I think there are variations in the Sunburst area.

Q You have the Globe well north of the National without any Sunburst, and I was just wondering why that tight area could not come into that area?

A The Globe well i s below the gas/water interface, minus 785, and the sand is present, it is present over to the Patricia area. In other words, this pinchout on the

best interpretation we could make was on the very crest of the Madison high, and then it pinches out to the south where we show the dotted pinchout line as being the interpretation of the sample logs which we found on the electrical log. It also holds for the wells in south Princess. We show no Sunburst as being developed in the south Princess area, and there is a batch of oil wells shown in Township 19, Range 11, West of 4. That is, in essence, the basic control for the Princess Sunburst.

Q Well, this is controlled also by seismic information, is it?

A We had no seismic information. The seismic information would not give us a configuration of the Sunburst, but we had enough well control with the California Standard No. 38 to the crest of the area of the Madison.

Q That is, you were using the high on the Madison?

A Yes, and with the occurrence of the Sunburst in relation to the Madison, we felt very strongly that the Sunburst has developed along the flanks of the area there on both sides. There is no reason to find any major change in sedimentation as we come along the flank of the Princess high. It will take more wells to delineate these areas, there is no doubt of that.

Q MR.PORTER: Mr. Dougherty, were not a lot of these wells drilled as oil wells?

A Yes, sir. The Cal-Standard Company was drilling for Madison and Jefferson oil underlying the Sunburst. The practice after a few blowouts in these gas sands was to load the hole with heavy mud and plough right on

through the gas sands into the oil, so that after a few times of having the wells kick out, there were a limited number of drillstem tests taken in the gas sands, the primary interest being the development of the Madison and Jefferson oil.

Q MR. GOODALL: Wasn't oil found in the Sunburst as well as the Madison?

A There were some very minor edge accumulations of oil. I think none of the wells produced very much oil, over 5 or 10,000 barrels, it was very small.

Q I think the Standard Company tested the Sunburst regularly?

A Yes, but the sands were tested irregularly in the Basal Alberta and the Bow Island.

Q I was talking about the Sunburst?

A I think the Sunburst was very well tested with regard to the wells I recited a little while back.

Q Yes?

A There is fairly good control on the Sunburst where wells were drilled.

Q Yes?

A The next field I refer to is the Rainy Hills, the area which we show as having on page 1B possible gas reserves in the Bow Island sand, the Basal Alberta sand the Sunburst sand, and the Madison limestone, and proved, probable and possible reserves in the Basal Alberta sand. The well in the Rainy Hills feature is a capped or shut-in gas well in the Basal Alberta. Referring then to pages 25, 26 and 27, in Census Division 3 of Exhibit 4, in the Bow Island horizon we estimated that there were possible reserves in the Rainy Hills feature, as drilled through

by the Anglo-Canadian No. 1 Rainy Hills, located in Township 19, Range 10, West of 4, Section 34, Lsd.5. This is an isolated well on what was indicated had a geophysical high in the Madison and appears to lie along what we term the Rainy Hills-Steveville trend. The total depth was reached in 1939, the first total depth in 1939 of 3370. It was progressively drilled deeper by this Company in search for oil, and ultimately ended at a total depth of 4095 feet in July of 1945. It was plugged back to 2720 and the valve was welded on top and capped as Basal Alberta gas well with an open flow of from 5 to 7 million cubic feet between 2930 and 2943. Shows of gas were encountered in the Bow Island sand on a drillstem test, which covered a very wide interval, 2526 to 2585, and we estimate there is some possible gas saturation there of a limited character. The Basal Alberta, however, on which we assign proved, probable and possible reserves, the area there is shown on page 26, the net sand thickness is estimated at something on the order of 4 feet with a flow of 5 to 7 million cubic feet per day. Such structural data as we can interpret would indicate that it is a broad feature and the sand might be distributed quite well over the feature since it occurs to the north also in the south Steveville area, as shown on page 26. The Basal Alberta has been uniform in thickness within narrow limits over the entire east half of the area shown on page 26.

The Madison horizon was drillstem tested between 3312 and 3315, and gauged 45 million

cubic feet of gas, and then either the well bore was plugged, or something mechanical happened, because the well was tied down before it was drillstem tested from 3325 to 3332 with 7 million cubic feet. We do not exactly know what the physical situation is, or what occured in the reservoir, so that we indicated only possible gas reserves in this Madison horizon, even though we had a large volume of gas on test. There were no tests in the Sunbyrst sand, so that we have indicated that as being a possible reserve. The sand has developed. The electrical log characteristics are more or less indeterminate. I think that completes the discussion of the Rainy Hills feature.

Q MR. GOODALL: Was the Sunburst sand correlated?

A Not to our knowledge. We have no tests with regard to that. Of course, there is a problem in correlation at the top of the Madison with some of those drillstem tests in the top of the Madison, that 45 million cubic feet might go into the detrital material and into the Sunburst. We do not have an adequate sample of that well to determine that. We think the Sunburst is a different producing horizon, but it will take more tests to define that.

The next field of interest would be the Steveville area, what we have designated as the Steveville South and the Steveville North, which runs along this general structure area from the Tide Lake area north through the Rainy Hills area to the Steveville area, and ultimately we think is on the same feature that the Cessford pool in Census Division 5 is located. Our structural work was carried over the entire area of the

Princess area, and extended into the Cessford area, and the general character of the accumulations seems to be similar in many respects. That is one reason why we think the potentialities of the Princess area are good.

Referring to the Steveville area, as shown on pages 1B and 1C of Census Division 3, Exhibit 4, we have Bow Island sand, Basal Alberta sand, and the Sunburst sand reserves estimated for both the north and south Steveville features. The proved reserves are limited to the Basal Alberta and the Sunburst in these areas. We show probable and possible for the other sands based on more limited control. In detail, referring first to page 25, the map of the Bow Island gas sand, the first control well is the Anglo-Canadian No. 1 Steveville in Steveville North. This well is located in Township 21, Range 12, West of 4, Section 13, Lsd. 2. This well was perforated from 2454 to 2486, with some gas and a show of water. We have no electrical log. We estimate a very limited thickness of sand as being developed. We show that the area has possible reserve potentialities because of the presence of the gas, and at a different structural position we might have other accumulations present. In the Steveville South area, in Township 20, Range 11, West of 4, in the Bow Island, the Princess No. 1 Steveville well in Section 14, Lsd.7, drillstem tested between 2516 and 2567....

Q MR. STEER: What is that location again, please?

A Township 20, Range 11, West of 4, Section 14, Lsd. 7.

That is the Princess No. 1 Steveville. This well produced and sold gas and a limited volume of oil. We have a Halliburton log, but could not estimate the sand thickness. We feel that there are probable reserves there, but we have no good data on the magnitude of them on the basis of the one well. Township 20, Range 11, Section 14, the Princess No. 2 Steveville was completed as a Basal Alberta gas well below this horizon, and the gas was tested for between 2520 and 2569 in one of the Bow Island sands, the others were not tested, and this well recorded 18,000, no, I am sorry, 110,000 cubic feet of gas. The tests were inadequate. The other sands from the electrical log looked to be of a character sufficiently similar to the gas-producing sand to be considered as probable gas-bearing sand.

Q MR. GOODALL: 110,000?

A Yes, sir. In Township 20, Range 11, West of 4, Section 14, Anglo-Canadian No. 2 Steveville drillstem tested the first Bow Island sand at 2520 to 2560 with a half million cubic feet, but the remaining sands were not drillstem tested.

We have only the electrical log on the Devonian so that the data is incomplete. That is one of the difficulties through the Princess area, that although considerable gas was shown, the test procedures were limited and inadequate to evaluate the area, but on the basis of the structural control and the distribution of the limited data, the potentialities are considered by us to be important.

J.F.Dougherty,
Cr. Ex. by Mr.Steer

Turning now to page 26 in the Steveville area, the Basal Alberta sand in the Steveville North, Anglo-Canadian No. 1 Steveville, in Township 21, Range 12, West of 4, Section 13, and that is the southernmost well on the North Steveville trend.

(Go to page 524)

J. F. Dougherty,
Cr. Ex. by Mr. Steer.

A It was drill stem tested between 2740 to 2750 with 11 million cubic feet, perforated 2740 to 2750 open flow of 12 million cubic feet, and when producing at the rate of 6.5 million cubic feet a day produced 92 gallons of naphtha per day and some salt water. We estimated the gas-water contact at minus 446 feet sub-sea. That has been completed as a shut-in Basal Alberta gas well. More recently you may remember that the Sweet Grass No.1, a McGill well, was drilled in 1951, this year, in Township 21, Range 12, West of 4, Section 34. That is the well within the proved limits in the northern portion of the Steveville north area. No electrical log was run on this well but this well blew wild for some days, presumably out of the Sunburst,but no one knows for sure because no electrical log was run and we do not know what the bottom hole formation was at the time the well blew out. However, before the well blew out, a drill stem test was taken on the Basal Alberta sands between 2778 and 2795 with approximately 2 million cubic feet a day of gas on test, so that the one and probably two horizons are gas productive there. The people that drilled the well, the operators, called the blowout as being in the Sunburst and volumes were estimated up to 20 million cubic feet per day, but I have seen no gauges to substantiate that.

Q MR. C.E. SMITH: Did you look at the newspapers about that well, Mr. Dougherty?

A Yes, sir.

Q That was a gauge?

A We were never able to find out whether it was a gauge.

Q I am not suggesting you should use the newspapers as your data, Mr. Dougherty.

A A third well which gave a little additional control is in our possible in Steveville north, the Anaconda No. 1 Steveville, Township 22, Range 12, West 4, Section 9, north of the Sweet Grass McGill well. Gas is reported between 2771 and 2795 in the Basal Alberta. We could find no electrical log or any gauge of the volume of that gas so that we left that well as being in a possible area of gas saturation. In the Steveville south area in Township 20, Range 11, West of 4, in Section 12, the Princess No. 2 Steveville was completed as a potential Basal Alberta gas well with a potential of 10 million cubic feet of gas between 2856 and 2869. We estimate that the net sand thickness is 8 feet based on electrical log interpretation and the drill stem test data.

Also in the same section is a second gas test in the Basal Alberta, the Anglo-Canadian No. 2 Steveville, Section 14, Township 20, Range 11, West of 4. Drill stem tested 1½ million cubic feet between 2831 and 2853. Estimated net sand thickness 5 feet. That well was completed as a Madison oil well and was then abandoned for lack of gas market.

Turning now to the Sunburst horizon, map page 27, in the Steveville north area, as discussed a few moments ago, the Sweet Grass McGill well lost circulation at 2934 feet and the well blew in wild. That depth is the basis for the operator and

calling it as likely in the Sunburst. Our correlation would indicate that it could well be the Sunburst and we have tentatively showed that gas as occurring in the Sunburst. Another well or wells should be drilled to get complete data on the Steveville north area but its proximity to the Cessford area as shown on the large map of Alberta suggests that the Sunburst accumulation in the Cessford area may be almost continuous with this Steveville trend in the Princess area. In the Steveville south area we ran into a number of difficulties in attempting to interpret the well log data and although we have shown the areas as only probable, our later examination would indicate that the tests shown on the Anglo-Canadian wells and the Princess-Steveville wells were in the Sunburst sand at depths ranging between 3217 and 3271. The Anglo-Canadian No. 2 Steveville in Section 14, Township 20, Range 11, tested 15 million cubic feet between 3217 and 3262. We have no electrical log but by correlation it appears to be in the Sunburst sand. The Princess No. 2 Steveville in the same section on which we have electrical logs, drill stem tested gas between 3236 and 3271 in what was definitely the Sunburst and the correlation with the No. 2 Steveville, with the 15 million foot test that was recorded, would indicate that the Sunburst is the producing horizon. The gas-water contact on the basis of the drill stem tests and the electrical logs in the No. 2 Steveville was indicated as being at minus 785 feet sub-sea.

J. F. Dougherty,
Cr. Ex. by Mr. Steer.

The next area of interest is the Tide Lake prospect which lies south of the Rainy Hills area for which we show possible gas saturation and possible gas reserves in the Bow Island and Basal Alberta, as shown on page 1-C, census division 3, Exhibit 4, under line 21. Referring to the map exhibit, we have gas indicated in the Tide Lake Province Cal-Standard No. 1 well, located in Township 18, Range 9, West of 4, in Section 19. This well was drilled to a total depth of 4250 feet in search for Madison or Jefferson oil. The test data is limited, we have not been able to run down volumes measured, but gas was tested between 2481 and 2497 in the first Bow Island sand, between 3128 and 3167 in the Sunburst sand, and in the Madison limestone. The well was abandoned after failing to find oil production in the Madison and Jefferson. We have shown this area as having possible gas saturation and possible reserves based on very limited data but it is apparently on the same structural trend and additional drilling down the flanks we feel will demonstrate reserves of gas saturation that could be moved into the probable and proved categories.

The last prospect within this so-called Princess Area, is the Toronto prospect, which is located on the boundary line between census division 3 and census division 5, south of the Cessford area, on page 1-C of census division 3, Exhibit 4. We show Bow Island sand reserves as being possible and Basal Alberta sand reserves as proved and probable. The control for this area is based on the Toronto Syndicate

J. F. Dougherty,
Cr. Ex. by Mr. Steer.

No. 1 well drilled in Township 22, Range 13, West of 4, Section 6, Lsd. 1. In the Bow Island sand, map on page 25, we have indicated a possible area of gas saturation based on electrical log interpretation because there were no drill stem tests taken in the sand. The Basal Alberta referred to, map page 26, was drill stem tested between 2880 and 2892, estimated volume of gas 2 million cubic feet. The core analysis indicates 24 per cent porosity and some of the permeability measurements ranged up to 1584 millidarcies. The cores were fragmental and one or two analyses only were available. The No. 2 Toronto Syndicate well was drilled in the same section, township and range. We have no supporting drill stem test for the Basal Alberta sand but the electrical log correlation between the No. 1 well and the No. 2 well would indicate net sand in the order of 5 feet in thickness. We have no control on deeper horizons, no possible gas saturation was indicated. I believe that covers the Princess area so far as our work has been carried.

Q MR. STEER: That area I referred to is the Patricia-Princess area?

A Yes.

Q Of some 1600 square miles?

A Yes.

Q And the methods used and the principles that you applied are the same with respect to this area as they were with regard to the Viking-Kinsella area?

A The general scope, the details are always different.

Q Quite so. And you told me, I think, that that was the method you followed throughout in making your computations?

A Yes, sir. We attempted to analyze all the data available and use all known geological and engineering methods.

Q I will only keep you a few minutes more, Mr. Dougherty. I asked you yesterday about well No. 26 located in Section 18, Township 48, Range 10, of the Viking-Kinsella area.

MR. C.E. SMITH: What was that location again?

Q MR. STEER: Section 18, Township 48, Range 10. Now, you have given us for that well, Mr. Dougherty, a thickness of 23 feet?

A This is well No. 24?

Q 26.

A Would you give me that township and range again, please?

Q Section 18, Township 48, Range 10.

A Yes, sir.

Q And you give us 23 feet?

A Yes, sir.

Q Now, I am handing you the material which the company, Northwestern Utilities, have with respect to that well.

A If I may have a moment to pull out our own records, please.

Q Certainly.

A Yes, sir.

Q Now, what I have handed you is the company's electrolog and core analysis, is it?

A Yes, sir.

Q And would you look at those and tell us whether you would

not read those two documents as indicating a thickness of 12 to 14 feet rather than your 23 feet?

A No, sir. We have the same data in our files, this core analysis and this electrical log.

Q So your interpretation of those documents I have handed you is a thickness of 23 feet?

A Yes, sir.

Q Then I think that perhaps I will ask the Board if I may file these documents which I have handed to Mr. Dougherty. These are the only records the company has and I assured Mr. Patterson, who is in charge of them, that they will be returned to them after they have served the Board's purposes.

THE CHAIRMAN: Exhibit 13.

MR. C.E. SMITH: Are they marked as one?

THE CHAIRMAN: Yes.

CORE ANALYSIS AND ELECTROLOGS PUT IN AND MARKED EXHIBIT 13.

(Go to page 531)

Q Then I will ask you, if you will, to look at . . .

A I would like to make an observation, if I may.

Q I have no objection to that, although I think it is perhaps unnecessary. You interpret the document one way and I have suggested that another interpretation should be put upon it, but if you want to explain, it is all right.

A I would like to explain my reasons.

Q Yes?

A I think that is part of my reason for being here.

Q Very well.

A That well was perforated by Northwest Utilities over an interval from 2173 to 2198. The difference between those measurements would indicate that 25 feet were perforated. It is not usual for a producing company to waste 50% of their shots on non-productive sand. Our interpretation is this, if you will note on that core analysis a little symbol a in parenthesis "Sample too soft and friable to cut a permeability specimen", and with regard to core determinations, and much of these core analysis reports have that on them. The porosities on this particular sample, on these samples range from 16.8% to 30%. We certainly feel that most of that interval, if not all, is effective gas-saturated material and will effectively yield gas. The permeabilities range on this analysis between 429 millidarcies and .87 millidarcies, where it could be measured. We have no doubt in our mind that seeing that section was perforated with the exception of shaly breaks limited to about 6 feet out of the interval between 2170

and 2200 is effective gas-producing section.

Q Would you say that any competent geologist looking at that electrolog and core analysis ought to come to the same conclusion of 23 feet, you would say that, would you?

A He might not. That is our conclusion.

Q Well, then, why would he not reach the same conclusion that you have reached?

A Perhaps he has not seen as many core analyses and electrical logs as we have.

Q Oh, I see. I wonder if Mr. Davis has seen as many core analyses and electrologs as you have?

A Quite possibly.

Q Well, then, will you look at Well No. 14 located in Section 29, 47, 11?

DR. GOVIER: Mr. Steer, could I have that again?

MR. STEER: Well No. 14, in Section 27, Township 47 - I am sorry, in Section 29, Township 47, Range 11.

A Yes, sir.

Q What material have you from which to compute a thickness of, I think you gave it as 22 feet?

A We have very limited data.

Q What did you have?

A This well was completed, I think, in 1932 - -

Q No, just a minute.

A Have I got the wrong well?

Q Well, this well No. 14 I am told was drilled in 1943?

A I am sorry. I am in the wrong section.

Q Section 29 of Township 47, Range 11?

A Yes, sir.

Q Now, tell us what data you had in connection with it?

A We have only the electrical log. We did not have the core analyses, core analysis, although I understand that one was made, or, at least, the well was cored.

Q Now, I am going to show you a part of the company's records, being a general geological report by S. E. Slipper of the Viking-Kinsella gas field based on field data to November, 1943, in which he makes on page 23 some comments on this particular well.

A Page 23?

Q Yes, would you read that over?

A Yes, sir.

Q Perhaps you will tell me, the sand, it appears from that report, was cored from 2075 to 2085 with 10 feet of recovery of the sandy shale grading into sand. Is that what the report says?

A Yes, sir, that is Core No. 1.

Q Would you give very much pay to that core?

A I think unless I read the whole thing I could not comment on it before we discuss this.

Q Well, you read it.

A Core No. 2, 2085 to 2095, a 10-foot interval, 4 feet recovery, soft shale with some sand. Core No. 3, 2095 to 2105, 10 feet recovery, sandy shale 2 feet, sand ½ foot, shale 7.5 feet. Electrolog and coring unsatisfactory on this well. Casing point 2065, top of gas sand by

electrolog 2082. Our interpretation . . .

Q You are going to read it and then we are going to talk about it?

A That is the full report.

Q I beg your pardon?

A That is the total report on No. 14.

MR. PORTER: Mr. Chairman, the witness, in answer to counsel's question, is, I submit, in all fairness, entitled to pursue his and not counsel's method of answering, free from dictation about the method he will choose. Go ahead Mr. Dougherty.

MR. STEER: I made no dictation whatsoever, if the record will be referred to.

MR. PORTER: Well, I would like the record read. The witness undertook to read what was in the report.

MR. STEER: Yes, the witness undertook to read what was in the report, and then the understanding between the witness and me, whatever my learned friend may say, was that we were going to discuss the report, which I now, with the Board's approval, propose to do.

Q THE CHAIRMAN: Have you had an opportunity to read it all, Mr. Dougherty?

A That finishes that section.

Q That is all you want to read?

A Yes.

Q Would you answer Mr. Steer now?

A Yes, sir.

Q MR. STEER: The first 10 feet of the core

I had read previously, and you did not read that, from 2075 to 2085, 10 feet recovery, sandy shale grading into sand. That is correct?

A Yes, that is correct, but most of that, however, is above the top of the Viking sand, so that it is not pertinent, cutting into the sand within the last three feet, which would bring it into the top of the Viking.

Q Then it is true to say that you would not expect to get very much pay out of that particular 10 feet?

A No, that is above the sand.

Q You would attribute no pay to it?

A From the electrical log interpretation it would appear that the top of the first permeable sand would be about 83.

Q The report says 82?

A Yes.

Q Yes?

A So that we would interpret several feet of sand which would be gas-bearing. You see, descriptive terms like "sandy shale grading into sand" depends on who tests it. I do not know who did that. You cannot tell whether a sandy shale is permeable or a very fine-grained friable sand, grey in colour, which may have a porosity of 20% and a permeability of 50 millidarcies.

Q Do you know anything about that?

A No. I am pointing out the pitfalls in using willy nilly some of these descriptive phraseologies with regard to samples.

Q I am trying to point out to you the weakness in your

estimate of 22 feet of pay from this particular well?

A I quite understand that, but I am working just as hard the other way.

Q I appreciate that. Well, then, we do not attach much importance to that?

A Yes, sir.

Q Now, Mr. Dougherty, you understand me?

A Yes, sir.

Q We are attempting to interpret the material that you have before you, consisting of the electrical log and Mr. Slipper's report?

A That is correct.

Q And it would be true to say, then, that you do not attach much importance to the first 10 feet of this core?

A 2 or 3 feet of importance, we would.

Q How do you arrive at the 2 or 3 feet?

A From the electrical log. In other words, the data is still limited and this has got to be interpreted. I assume no core analysis was taken of the gas as none has been submitted by you.

Q Yes.

A Therefore we have no data to check either my interpretation or Mr. Slipper's of the actual porosity or permeability.

Q Then you read that from 2085 to 2095 there was 4 feet of recovery which was described as soft shale with some sand?

A That is true. That means that 6 feet was missing and I assume it was soft and friable sand, and from the electrical log it shows very high self-potential.

Q Would you say you had 6 feet of pay there?

A Something in excess of 6. It says soft shale with some sand, whatever "some sand" may mean in this description.

Q I see.

A The description is inadequate.

Q So that your estimate of 22 feet then, if this description is inadequate, and it is not according to you, your finding of 22 feet is based entirely on this electrolog?

A Yes, sir, that is all we had. Those are all estimated net thicknesses by electrical log.

Q I will ask you this question, Does your reading of Mr. Slipper's report alter the view with regard to this sand which you formed from the electrolog?

A Not particularly, because the electrical log would seem to indicate a self-potential which we are going to consider in our work as being effective porosity.

Q I see.

A We have got some shale, but the descriptions themselves are, I would say, of a lesser order of accuracy than the electrical log.

Q Very well. Your answer to my question is "no"?

A Yes, sir.

Q Then I will refer you to Well No. 61.

MR. PORTER: Might we have this report marked for identification? I understand Mr. Slipper is to be with us in the capacity of a witness, and if the report can be retained there might be some useful discussions about how good his eyes are.

MR. STEER: I would suggest that it may be marked as an exhibit for identification. However, just as the Court sees fit.

MR. C. E. SMITH: Why not mark it as an exhibit?

MR. STEER: I have no objection.

THE CHAIRMAN: Mark it as Exhibit 14.

MR. PORTER: I had only in mind that you might want it back.

A GENERAL GEOLOGICAL REPORT BY MR. SLIPPER ON VIKING-KINSELLA GAS FIELD MARKED EXHIBIT 14.

Q MR. STEER: Now, then, Well 61, in Section 4, Township 47, Range 10.

A Well No. 64?

Q 61.

A 61?

Q Yes?

A Yes, sir.

Q You show that to be within your 15 foot contour, having a thickness of more than 15 feet, is that right?

A That is a new well which has been completed I assume from the dates in August, on August 10th, 1951. We have not to my knowledge received an electrical log yet or any data other than that it is an 11 million foot well in that location.

Q Then from what do you compute your thicknesses?

A We did not use that well. It was not completed at the time these maps were made.

Q No, but is it or is it not within your 15 foot contour?

A Yes, sir.

Q Then I am going to show you the electrolog?

A Yes, sir.

Q And ask you whether a study of the electrolog would

alter your judgment?

A I would like a little additional information, if you could provide the interval of perforations, please?

Q I will see if we have it.

A We do not have that here.

Q The answer is it was not perforated?

A The casing was set where?

Q On top of the sand.

A I assume that would be somewhere around 2115 or 2110, somewhere in that vicinity.

Q Yes?

MR. DAVIS: The top of the sand is shown on your electrologs.

A Well, the casing not always winds up on the top of the sand, as you well know.

Q MR. STEER: What is that, again?

A The casing does not always wind up on top of the sand.

MR. DAVIS: I was not talking about the casing, I was talking about the sand.

Q MR. STEER: Does the electrolog show where the casing was set?

A No.

Q Does the electrolog show the top of the sand?

A I would estimate it to be 2118, where it is located on the log here, yes, sir.

Q Yes. Now, then, if you will assume that the casing was set as near as practicable to the top of the sand, would that be a reasonable assumption?

A I think so.

Q Yes?

A Might I ask again whether it was an open hole completion or a perforation completion?

Q Well there is no perforation?

A How about the plug back? Is the hole open to the total depth?

Q Yes, the hole is open to the total depth.

A It was not plugged back then?

Q Not plugged back, no.

A Then we have an open hole from 2118 plus or minus to 2175, the final piece of the drilled sand section is somewhere around 2150, plus or minus, based on the resistivity of the shale line, perhaps 55 or 60 actually, so that we have an interval open from 2118 to the total depth of which there is a sand body of variable character from 2118 to about 2160.

Q Excuse me, Mr. Dougherty.

A Do we have a core analysis on this well?

Q Yes, I think you have it here. I think you should have this report.

A Yes, I think I had two.

Q That is a core analysis?

A That is a core description.

Q That is a core description corresponding with what you were giving us from the electrolog?

A That would cover, I suppose, most of the interval?

Q Perhaps you would read that over?

A No analysis, however, has been made of the core taken?

Q No.

THE CHAIRMAN: Possibly we might adjourn now to give Mr. Dougherty an opportunity of studying it.

(The Hearing resumed after a short adjournment.)

THE CHAIRMAN: Gentlemen, we were wondering if counsel would object to starting at 9:00 o'clock tomorrow morning, going through to 12, and resuming at 1:30 and quitting at 3:30.

MR. STEER: Quite satisfactory, sir.

MR. S.B. SMITH: Quite satisfactory.

MR. McDONALD: Agreeable.

MR. PORTER: Quite satisfactory.

MR. C.E. SMITH: I wonder, sir, might I intervene just for a moment with respect to a matter which was brought to the Board's attention and in turn to counsel's attention. You will remember you advised counsel that you had a communication from some representative of the Province of Ontario indicating that they would like to be before the Board and make a statement or submission, whatever it may be, and it was arranged at that time that with the consent of everybody concerned that they might so appear this morning. I have been advised that Mr. Crozier, the Fuel Controller for the Province of Ontario, is here accompanied by, I think, two or three other gentlemen, and at this time I would suggest that probably Mr. Crozier could intervene, as we had previously arranged. I think I should add this, that he is not by any means being called by me as Board counsel and it is a matter of courtesy of other counsel here that he appears now and says what he wishes to say. I do not see Mr. Crozier. Probably if you would ask him to come forward.

A. R. CROZIER, having been first duly sworn, testified as follows:

Mr. Chairman, gentlemen, I am here today to place before the Board the position of the Province of Ontario with respect to natural gas, and I should like to read to you a very short submission which is as follows:

ONTARIO GOVERNMENT SUBMISSION

to

THE PETROLEUM AND NATURAL GAS CONSERVATION BOARD

of the

PROVINCE OF ALBERTA

Owing to the rapid depletion of the natural gas fields in the Province of Ontario and the uncertainty of supply and cost of fuels and materials with which to produce manufactured gas, it is imperative that the Province of Ontario procure large volumes of natural gas on a firm and long-term basis, at an early date.

The development of large petroleum and natural gas reserves in the Province of Alberta have been watched with keen interest and it is the hope of this Province that consideration will be given, at this time, to the needs and requirements for natural gas in the Province of Ontario.

Under present conditions, this Province depends almost entirely upon outside sources for its coal and oil, and each year to a greater

extent, for natural gas.

The Province of Ontario wishes to go on record at this hearing that it requires substantial volumes of natural gas, and therefore petitions this Board to give every consideration possible to its need for an adequate supply of natural gas.

DATED at TORONTO, September 17th, 1951.

"A. R. CROZIER" (sgd)

A. R. Crozier,
Fuel Controller.

Now, Mr. Chairman, I would just like to say that that is our statement and that there is present here today Mr. E.J. Tucker, Vice President of the Consumers' Gas Company of Toronto. His company serves a very large area, a very large population in the Province of Ontario. And also Colonel Weir, Vice President of the Union Gas Company which operates in southwestern Ontario and also serves a very large section of the Province of Ontario. These gentlemen are here today for the purpose of substantiating any statement I have made, and I would like to make it very clear that the statements I make are statements as to the needs in the Province of Ontario for natural gas.

SUBMISSION OF PROVINCE OF ONTARIO PUT IN AND MARKED EXHIBIT 15.

THE CHAIRMAN: Are there any questions? May we have Mr. Dougherty back, Mr. Porter, please.

J. F. Dougherty,
Cr. Ex. by Mr. Steer.

JACK F. DOUGHERTY (recalled)

continued cross-examination by Mr. Steer:

Q You were looking at well No. 61, Mr. Dougherty?

A Yes, sir.

Q And you have now examined the electrolog of that well and the report of the core?

A That is correct, yes, sir.

Q Yes. Now, I am going to suggest to you that instead of having that thickness of 15 feet plus, as shown by your contours, the thickness ought to be,at the outside, 7 feet?

A My estimate is it would range between 8 and 10 as a minimum. I would not argue much for 7 feet.

Q And I spoke to you about the Viking wells. Well No. 20 you have shown with a thickness of 12 feet, is that right?

A That is the well in Township 49, Range 12, West?

Q I should have a description for you. I do not have them in my notes.

A I think that is the only 20 in the Viking area, yes.

Q Well No. 18, 11 feet?

A Yes, sir.

Q And well No. 19, 11 feet?

A Yes, sir.

Q And well No. 12, 11 feet?

A That is correct.

Q And well No. 16, 13 feet?

A Yes, sir.

Q Well No. 15, 9 feet?

A Yes, sir.

Q Well No. 22, 11 feet?

A Yes, sir.

Q Well No. 11, 14 feet?

A It is either 14 - I will have to check that. That is well No. 11, yes, 14 feet.

Q Well No. 21, 5 feet?

A Yes, sir.

Q And No. 14, 4 feet?

A That is correct.

Q And 23, 11 feet?

A Yes, sir.

Q And 17, 12 feet?

A Yes, sir.

Q And 10, 13 feet?

A Yes, sir.

Q Now, I think you told us, Mr. Dougherty, that in estimating these thicknesses since you did not have the ordinary electrologs you attached importance to the proved thicknesses of the sands to the east and west of the area, would that be right?

A In the surrounding area plus the notations which we found in Mr. Leisemer's notes on those wells since we have no record of core analyses or electrical logs, those having been drilled years back.

Q Yes?

A We put those thicknesses on there to give us a basis for making an isopachous map, realizing that the data is not good at all.

Q Now, would you give me those notes of Mr. Leisemer's so that I can have them examined?

A You might reproduce them. We would like to have them back so that we can work with them.

Q Could I have them overnight so that I could have them examined?

A Yes, sir.

Q Perhaps I could have them now?

A Well, at the end of this session or discussion.

Q Yes, very well.

A And I will see that counsel reminds me.

Q Thank you. Now then, to the east the nearest wells in this group from which you have cores and electrologs were Northwestern Utilities' Kinsella 20?

A That is correct.

Q Showing 10 feet of sand?

A I think we show 12. I think that is 12 if we refer to the same well in Section 35 of Township 48, Range 12, West.

Q Well, I apparently have been misinstructed because I have 10 here. So we will take that as 12?

A Yes.

Q Imperial Kinsella No. 23?

A That is right.

Q Showing 10?

A Yes, sir.

Q And Imperial Kinsella No. 24 showing 10?

A I have it 11.

Q And Imperial Kinsella No. 25 showing 6?

A No, I have 12 feet on my map, I believe, yes, sir.

Q Yes?

A I would add to that, however, that we also have a core analysis on Viking No. 10, the well to the northwest of the old Viking, in Township 49, Range 13, which we estimate at 9 feet.

Q Yes, I am coming to that.

A Oh, I beg your pardon.

Q A couple of miles to the east of these last two wells that I spoke of, that is, Imperial Kinsella No. 24 and Imperial-Kinsella No. 25, a couple of miles to the east you have Northwestern Utilities Kinsella No. 21?

A That is correct.

Q With 12 feet thickness?

A 19 feet, I believe, on our map.

Q I see. And then Imperial Kinsella No. 10 situated in 29-49-13. Your thickness there is 6 feet, is it?

A 9 feet.

Q 9 feet?

A Yes, sir.

Q I suppose these are different interpretations of the same material?

A Yes, sir.

Q I see. Now, then, I am going to suggest to you that on the basis even of the figures that you have, the probable approximate thickness of the old Viking wells should be given something better than No.10, which we had at 6 feet, 4 miles to the west, and something less than these Imperial Kinsella wells that we have spoken of?

A Not necessarily. There is going to be a lot of variation in thickness within a tight field as we have here, and

what is there up to the time, say, that you had drilled every section in this field, anyone's thickness map made now would not be correct.

Q No?

A But with the statistical averaging which the isopachous map attempts to do with this number of wells, I do not think we have a serious deviation from it. All of these wells come under a different distribution if we had all the well control. I cannot see any basis for that assumption.

Q I see. Now, if we assume that this well to the west, that is No. 10, is 6 feet?

A Yes, sir.

Q And if we assume that the wells to the east, some of these Imperial-Viking-Kinsella wells are much larger in thickness, we cannot give you a figure, wouldn't it be somewhere between the thickness of the easterly wells and the thickness of the westerly well that you would expect to find the thickness of these intermediate ones?

A No, sir.

Q I see.

A I do not quite follow the reasoning there. I would say rather for what limited data we have of the intermediate wells, and get what it would be that way rather than take an assumption that across that interval it is going to be a straight line relationship steadily decreasing. It is going to be very irregular in a stratigraphic trap.

Q I understood we were talking about wells about which we had no data?

A Very limited data.

Q That data would in itself be inadequate for the purposes of determining the thicknesses?

A I would not care to ignore it. I would like to see it with the data we have here.

Q What data have you here?

A We have those observations with regard to the thicknesses of the sand from Mr. Liesemer's notes.

Q From Mr. Liesemer's notes?

A Yes. In other words, we were limited in data there.

Q Let us throw Mr. Liesemer's notes out, without showing any disrespect to him,let us throw them out, and let us look at this matter from the point of view that I proposed to you, namely, I will ask you to assume 6 feet to the west, and 10 or 12 feet to the east, then would you say it is a reasonable assumption that in the middle area, which is the old Viking wells, you would have something between those two and the thickness of the sand.

A If you threw away everything else you could draw that conclusion. I don't know that I would.

Q Yes. Now, you are going to let me have Mr. Liesemer's notes so that we can see what there is in them which alters that viewpoint?

A I think you will find that the figures shown in there bear directly on the matter as being the only handhold that we had on those wells.

Q Do you know where he got them?

A I have not the slightest idea.

Q I see.

A He was the engineer for the Board for many years, and my

understanding from a discussion with Mr. Beach is that both he and Mr. Liesemer were interested in preserving as much of the limited data which existed at that time, data which the Gas Companies and the companies drilling did not preserve, according to their procedure, so that I wished to take advantage of what little had been saved.

Q Quite so. I am going to ask you to look at well No. 24. That well is in Section 22, Township 48, Range 12, West of the 4th?

A Would you give me that description again,please?

Q Section 22, Township 48, Range 12?

A Section 22?

Q Yes?

A Well No. 24?

Q Yes?

A Right.

Q I am going to show you the electrolog and core analysis for the well and ask you whether you have those before you?

A We have those core analyses.

Q You have those?

A And the electrical log, yes, sir. Do you wish me to identify those?

Q Yes, please.

MR. STEER: Did we mark, Mr. Chairman, the documents relating to well No. 61?

THE CHAIRMAN: I think we had. No, they are not marked.

MR. STEER: Would you please mark those documents relating to Exhibit 61, or Well No. 61?

A Do you want the particular page with the core descriptions?

MR. STEER: Yes.

MR. C. E.SMITH. What is going to be marked with regard to Well 61, the electrolog and the core description?

A The electrical log and the core description.

Q Yes.

DOCUMENTS RELATING TO WELL 61 MARKED EXHIBIT 16.

Q MR. STEER: Those documents related to Well 61?

A Yes.

MR. STEER: That was marked Exhibit 16?

THE CHAIRMAN: Yes, Exhibit 16.

MR. S TEER: And would you please mark the electrolog and core analysis of No. 24 as Exhibit 17?

THE CHAIRMAN: Exhibit 17.

ELECTROLOG AND CORE ANALYSIS OF WELL NO. 24 MARKED EXHIBIT 17.

MR. C. E. SMITH: Excuse me. This is in Section 22? There are about th ee 24s in that township.

MR. STEER: Section 22, that is right.

Q That is right, isn't it, Mr.Dougherty, Township 48, Range 12?

A Section 22, yes, sir.

Q Now, then, from the electrolog and core analysis which is in as Exhibit 17, you made your computation and you got a thickness of between, somewhere, 15 feet and 10 feet?

A We assigned 11 feet, yes, sir.

Q Would you quarrel with 8?

Q
A Yes, sir.

Q Well, then, will you look at well No. 25?

A Might I make this observation on this last well?

Q Yes?

A This well, No. 24, has, to my recollection, the nicest porous section and the most highly permeable section of which we saw. For example, between 2198 and 2209 there was only one-half foot below 20% porosity, and it ranges up to 36%. The permeability runs from 18% to 650 millidarcies, I mean 18 millidarcies to 650 millidarcies. I have no doubt that with that type of a section that perhaps even our thicknesses may be less than the reality since the pressure differentials across the type of the porous sections are going to be of a very adequate type and enable the getting of gas from lower permeable ranges.

Q Tbe evidence on which you base your opinion is permeability?

A And porosity together.

Q And porosity together?

A Yes, and the electrical log.

Q And the electrical log?

A Yes.

Q And because of high permeability and high porosity, you would relate those two things to thickness?

A Yes.

Q The thickness of the sand?

A Yes, sir.

Q Because you have got the permeability and the porosity running through the whole thickness of the sand?

A Over a large part of it. You see, these samples are rather skippy, they are not for every single foot, so that you would have to correlate the core analyses and the electrical log and attempt to interpolate.

Q Yes. Is it possible that a shale could have a high or low porosity?

A Shales principally have high porosity and no permeability. However, we find that in sands which have thin shale breaks or are broken in sand and shale, that the general tendency is to under-estimate the effectiveness. This is particularly true in electrical log interpretation, because the electrical log cannot really define the shaly sand as well as a microlog.

Q When will you know whether you or Mr. Davis are right in your computations of these thicknesses, when all of the gas is produced?

A Likely.

Q Now, well No. 25 in 10 - just a minute - Township 48-12, Just a moment until I make sure that I am right?

A All right.

Q Well No. 25, section 10-48 -12-4. That is Section 10, Township 48, Range 12, West of the 4th. You have the electrolog and core analysis there?

A Yes, sir.

Q And you gave this sand a thickness of 12 feet?

A Yes, sir.

MR STEER: Could that be marked as Exhibit 18, sir?

THE CHAIRMAN: Exhibit 18.

ELECTROLOG AND CORE ANALYSIS
WELL NO. 25, MARKED EXHIBIT 18.

Q MR. STEER: That is right, that you gave it a thickness of 12 feet?

A That is correct.

Q And if Mr.Davis gives it a thickness of 6 to 8 feet, that is a difference in judgment applied by the two of you on the same material?

A Yes, sir. This is another case of high permeability and high porosity up to 1850 millidarcies and 33%. The core is not, unfortunately, complete. There is one sample of roughly, intervals of over 5 feet, so that again you must correlate this data with the electrical log in trying to interpret the real character of the sand. We are not unhappy with the 12 feet at all.

Q Yes. Then would you look at well No. 7 in Section 22, Township 49, Range 10, West of the 4th, let me know whether you have the electrolog and core descriptions which I now hand you. That description again is Section 22-49, is it?

A That is a single well in 49-10, yes, sir.

Q Now, have you electrolog and core descriptionswhich I have just handed you?

A We have the core descriptions and I am checking to see if we have the electrical log. I suspect we did not since we do not have a thickness there, but it won't take a minute to run it down.

MR. STEER: In the meantime, could we have these documents marked, sir, as Exhibit 19?

ELECTROLOG AND CORE DESCRIPTIONS OF WELL NO. 7 MARKED EXHIBIT 19.

MR. C. E. SMITH: That is well No. 7, is that right, Mr. Steer?

MR. STEER: Well 7, yes.

(Go to page 556)

A We did not have the electrical log.

Q Will you take a look at it, Mr. Dougherty, and will you read the core description? Will you take a look at the electrolog and will you read the core description from 1979 feet to the bottom of the hole, and then the question I want to ask you is whether, having done that, you think that this well ought to be in your proven area?

A Yes, sir. Starting at the top of the Viking sand at 1979 a core was taken, core number 11, 1979 to 1989, recovered 1 foot of badly ground-up core, 4 inches of shale, dark grey, fissile; 5 foot of shale -- I am sorry, with fine-grained grey sandstone in streaks and lenses. The second core 1989 to 1999, 2 feet recovered, badly ground-up core, essentially shale, with sandy streaks and patches, and a notation here "gas sand 1995" in pencil. Core No. 13, 1999 to 2005, 2 foot recovered, core jammed in core barrel. Shale as above with sandy streaks and lenses, 1 inch hard very fine-grained, grey sandstone with one shaly parting. Core No. 14, 2005 to 2015 feet, 10 foot recovered, 8 feet 3 inches of shale, dark grey, firm, containing numerous streaks, lenses and irregular patches of sandstone. One 2-inch concretion at 2007 feet. One foot 9 inches sandstone, grey, fine-grained tight, shale partings abundant. Core No. 15, 2015 to 2025, 100%, recovered 10 feet. 9 inches of shale, with abundant partings and lenses of sandstone. 6 inches shale and sandstone, about equal amounts of each in irregular and nodular bedding. 1 foot 3 inches sandstone, grey, fine-grained, tight numerous shaly partings and patches. 2 foot 4 inches sandstone and shale in

irregular and nodular bedding. 1 foot shale, dark grey, friable, with some small irregular bodies of sandstone. 4 foot 2 inches shale, dark grey, brittle Bentonitic in in part. Small sandstone patches in decreasing amounts. From the electrical logs the last two cores are below the base of the Viking section and I have essentially shaly. You will note that where the notation "gas sand 1995" was made that that particular core only recovered 2 feet out of 10 foot core, that the core was jammed in the core barrel, so through the gas sand we had the poorest recovery in the whole core procedure. Looking at the electrical log I would estimate it only 1 or 2 foot of net sand, which is the basis for the drawing of our proved limit with about 2 feet of sand thickness, where I had our proved limit, so I am not unhappy about that well being inside the limits.

Q That has been marked as Exhibit 19. Now Well No. 10 in 29-49-13-4. Do I take it that you had the electrolog?

A The Well No. 10? Yes, sir.

Q And I take it that you had the electrolog and the core analysis of this well, did you?

A That is correct.

Q Could that be marked then, sir, as Exhibit 20?

ELECTROLOG AND CORE ANALYSIS
MARKED EXHIBIT 20.

Q From your study of that material you give it a thickness of 9 feet?

A That is correct. I make this observation, he casing

was perforated on this well from 2166 to 2189. The well was cored from 2165. That is the first sample in which porosity was determined and cored through 2205, approximately. We have estimated that 6 feet occurring in the main as a potential kick on the basis of the core analysis and the electrolog and that an additional 4 feet of sand occurred in the small thinly developed sand members within the perforated interval based on the core analysis. We are not unhappy with that figure either.

Q Then I will ask you to look at 20, section 35-48-12-4. You had this material?

A Is that Well No. 25?

Q No, Number 20. Would you give me the description of the location again, please?

A That is Township 48, Range 12, West 4, Section 35, well No. 20.

Q Yes.

CORE ANALYSIS AND ELECTRO-LOG MARKED EXHIBIT 21.

Q Now for your comfort, Mr. Dougherty, I will tell you that you and Mr. Davis are close together on this. All I want is to have that material before the Board.

MR. C. E. SMITH: A mark on the wall for him, anyway.

Q MR. STEER: Then I have got one other. It is Well No. 8 in Section 22, Township 49, Range 11, West of the 4th?

A Well No. 8?

Q 9 in Section 22, Township 49, Range 11, West of the 4th?

A I do not follow that description.

Q Oh, I beg your pardon, it is Well No. 8.

A Yes, sir, Well No. 8 about the centre of Township 49, Range 11.

Q Yes. And did you have the material which I now show you and which I will ask to have marked as Exhibit 22?

CORE ANALYSIS AND ELECTRO-LOG MARKED EXHIBIT 22.

Q Did you have that material?

A Just a moment, sir. That is Imperial Kinsella 8?

Q Yes.

A We have the electrical log but we did not have the core description.

Q Would you take a glance at the core descriptions, Mr. Dougherty, and I believe it will not be necessary for you to read them into the record but if you will look at the core descriptions I would like you to tell me the reason you had for including that well in your proven area?

A I can tell you that right now, drillstem test of gas.

Q Gas mainly?

A My record here shows there are 49 Mcf or 490 Mcf.

Q I guess we had better find out which it is?

A .49MM. I assumed that is 490,000 cubic feet.

Q .49?

A .49.

Q MM?

A Yes. That would be about half a million, 490,000.

Q Is that your reason?

A Yes, sir. That is gas. That is what we are talking about.

Q And the thickness of the sand is what?

A We estimate it 2 to 3 feet. It is on the edge. We put it on the edge of the proved gas saturation area.

Q That would not be a commercial well, would it?

A Oh, with a little mud acid, I don't know. It might make a million and a half. It is a possibility. I would not think much of it, no, sir.

Q That is all, thank you.

MR. S. B. SMITH: Mr. Chairman, and Gentlemen: Mr. Crozier, I believe, intimated he was making his statement that Mr. Tucker, Vice-President of Consumer Gas Company, was here and available if required. I would like to ask the Board whether Mr. Tucker might come forward and whether I might ask him a few questions. The only reason I do so now, sir, I have no idea how long Mr. Tucker is going to be here. If he is only going to be here for the day, obviously it would have to be done before one o'clock.

MR. C. E. SMITH: Having regard, sir, to Mr. Smith's remarks, I take it if everybody is willing, so to speak, that that probably could be done, provided there is no suggestion by Mr. Smith that the Board or its counsel is calling Mr. Tucker. Mr. Tucker is here and if he wants to give some evidence and nobody objects, I take it Mr. Smith will have the opportunity of asking him some questions. I do want to emphasize that Mr. Tucker is not here at the Board's request or as a witness called by the Board's counsel or anything of that nature. Maybe I am splitting hairs but I would like that apparent.

THE CHAIRMAN: Mr. Steer, were you through with

your examination?

MR. STEER: Yes, sir.

Q THE CHAIRMAN: Before we call Mr. Tucker, just one point I would like you to make clear, if you would not mind, Mr. Dougherty, and that is to what thickness the boundary of your proven area has been taken down? I think in answer to a question yesterday you said about 4 feet?

A No, sir. 4 feet -- I believe the reference to that question is that 4 feet is the lowest figure in Township 48-9 but you will notice on the map that where we begin to draw our line the thicknesses were on the order of 2 or 3 feet. It is a very rough approximation. There was not enough control so that the average of the so-called possible area is 1½ feet below 2, in other words. If that was not clear before well I would like to make that clear.

Q So that the boundary of your proven area is roughly speaking between 2 and 3 feet?

A Yes, sir, with the irregularities modified by gas occurrences and similar data.

Q Yes. Does Mr. Tucker wish to come forward here and answer any questions counsel may wish to ask?

.....

EDWARD JOHN TUCKER, having been duly sworn, cross-examined by Mr. S. B. Smith, testified as follows:-

Q Mr. Tucker, you, I believe, are the Vice-President of Consumers' Gas Company?

A That is right.

Q And that serves the Toronto Metropolitan area?

A That is right.

Q Now, could I ask you this, in order that Alberta gas be desirable for the purposes of distribution by your company, does it have to be competitive with other fuels in your area?

A Yes, sir.

Q What effect would the cost of Alberta gas delivered to Ontario have upon the demand and consequently upon your requirements for Alberta gas?

A It would have a very large effect upon the demand. Just how much I am not prepared to say. I have not figures with me on market conditions but natural gas delivered in the Toronto area, speaking entirely of our own situation, would increase the sale of gas volume-wise in 5 years by 100%.

Q Assuming that it was competitive?

A Assuming that it was competitive with competing fuels, yes.

Q If you raise the price you are liable to drop?

A Likely, yes.

Q Do you desire to say anything further on the subject of gas at all, Mr. Tucker?

A Only to say this, perhaps, that the cost of manufactured gas in the Toronto area and in any area where manufactured gas is at present distributed has risen by tremendous leaps and bounds since, well take it back to 1939. The cost of labour involved has gone up 150%, the cost of coal well over 100%, the cost of gas oil well over 100%, and lately we have been using propane to make propane air gas and

that price is creeping up all the time.

Q Mr. Tucker, would your company have any objections to an exchange agreement whereby Alberta gas was carried to the Western United States and disposed of and used and United States gas in an equivalent amount was brought to Ontario and used there?

A You are asking if I would have any objection to it?

Q Yes?

A I have no objection to any agreement that would bring us natural gas in adequate quantities at an appropriate price.

(Go to page 564.)

Q So that the answer is that if the price were appropriate, you would have no objection to the exchange agreement of the kind that I have described?

A Yes.

Q And assuming equal dependability from other sources, from either source, and a cheaper gas, and a cheaper gas could be procured by you under the exchange agreement that I have suggested, you would then prefer the exchange agreement, assuming equal dependability and cheaper gas by reason of the exchange agreement

A A cheaper supply I would prefer.

MR. C. E. SMITH: I am glad that took so long to answer.

MR. S. B. SMITH: Perhaps the answer was obvious.

A I wanted to do it in the fewest words.

Q That is all, thank you.

THE CHAIRMAN: Does anyone else wish to question Mr. Tucker? Thank you, Mr. Tucker.

MR. STEER: I wonder if I could ask a question?

THE CHAIRMAN: Yes.

.....

CROSS-EXAMINATION BY MR. STEER:

Q Mr. Tucker, as a matter of information, would you tell us what the situation is with regard to Western Ontario and Detroit, with regard to gas?

A Me.Weir is here, the Vice-President of the Union Natural Gas Company, and that is his baby.

Q I see.

A If you care to ask him, I am sure he would tell you.

Q It might be of interest if we got that information.

THE CHAIRMAN: Thank you, Mr. Tucker. Mr. Weir, would you like to come up here and answer questions here?

MR. WEIR: Yes, sir.

.....

THOMAS WEIR, having been first duly sworn, testified as follows:

THE CHAIRMAN: Mr. Steer, would you like to ask Mr. Weir any questions?

MR. STEER: Yes, sir.

.....

EXAMINATION BY MR. STEER:

Q My question, Mr. Weir, was simply whether you would like to tell us what the situation is with regard to gas being supplied to Western Ontario from Detroit?

A There is no gas being supplied to Western Ontario from Detroit. There is gas being supplied which comes through Detroit from the Panhandle Eastern Pipe line.

Q Quite so.

A The situation is this, that in 1945 our company signed a contract with Panhandle Eastern Pipe Line Company for 5½ billion cubic feet annually plus 10% if we could take it. An application was made by the Panhandle Eastern Pipe Line Company to the Federal Power Commission for an export permit, and at first a Presidential permit was issued, and then ultimately the Federal Power Commission

in February, 1946, issued an export permit with certain conditions in it, to the effect, generally speaking, that gas could not be exported at any time when there was an unsatisfied demand on the Panhandle system in the United States. Further, they limited the volume to 2½ billion cubic feet, to 5½ billion cubic feet entirely, I mean, and they limited the period of delivery from the 1st of April to the 31st of October in any year. In other words, we were required to take all the gas in seven months, and we could get no gas in the winter months.

Q That amount involved storage, of course?

A Yes, we have adequate storage. Our Company accepted those conditions and proceeded with construction work as fast as was necessary to take whatever gas was offered to us under that permit. We were so badly in need of it that we simply had to get gas some way. We only received token quantities up until three summers ago. The summer before last we received 1 billion cubic feet under that contract, last summer we received just under 3 billion cubic feet under the same contract, and this summer to date we have been receiving gas at about the same rate as last year,and we have just about completed a larger diameter pipe direct from Windsor where the gas comes into Canada, direct to our storage area, a distance of about 63 miles. When that pipe is completed,we will be able to take larger volumes still, and we can see a possibility of obtaining a proposed 3 billion, 600 million this summer season. That still, of course, is not the

total volume of 5½ billion, but it has enabled us to get by, operating under restrictions as to housing and as to extensions into new areas.

Q What are the prospects in the near future of getting it up to your 5 billion?

A That is a problem. I mean, it is in the hands of the hands of the Federal Power Commission. We are hopeful, naturally, but we hardly can express an opinion about it. Now, I must add that in addition to that contract, after considerable negotiation, Panhandle Pipe Line Company had informed us that they were going to increase the capacity of their pipe lines by a very large volume, bringing gas in from a new source, and suggested that they would be able to serve us a much larger volume if there were a market available. We surveyed the available market and ultimately signed a contract with the Panhandle Pipe Line Company in March of 1950, which was later amended because one of the markets which was initially expected to be covered by that survey received gas elsewhere. That contract, as amended, was for 18 billion, 250 million annually for a period of 20 years, and that was estimated to be sufficient gas to serve not only the Union Gas Company's area, but the area served by Dominion Natural Gas Company, Central Pipe Line Company, United Fuel Investments Limited in Hamilton, and its subsidiaries, which serves the Hamilton area as far east as Oakville, and there were four other municipalities which we proposed to serve en route, which are now using manufactured gas, namely, Stratford, Kitchener, Waterloo and Guelph. The Panhandle Company

applied for an export permit for that volume of gas, and very lengthy hearings were held, not only in connection with the export permit, but also with many other phases of the Panhandle's business, it was only two weeks ago that the Federal Power Commission made an allocation of the Panhandle Company's available gas, at least for the coming winter, and in their finding stated that there was no gas available for export to Canada at this time, and the application was, therefore, denied without prejudice, and that is the situation at the present moment.

Q Thank you.

THE CHAIRMAN: Does anyone else wish to question Mr.Weir? Thank you, Mr. Weir.

.....

JACK F. DOUGHERTY, recalled, testified as follows:-

THE CHAIRMAN: Does anybody have any questions to ask Mr. Dougherty?

MR. S. B. SMITH: I have a few questions, and I will proceed if no one else wishes to proveed.

THE CHAIRMAN: All right, Mr.Smith.

.....

CROSS-EXAMINATION BY MR. S. B. SMITH:

Q Mr.Dougherty, I think you said that your firm of DeGolyer & McNaughton was engaged on this project, if you can call it that, in or about the month of September, 1950?

A Yes, sir, that is my recollection.

Q You were then with that firm?

A Yes, sir.

Q And you were then assigned to this work?

A Yes, sir, this is my prime assignment.

Q Since that time?

A Yes, sir.

Q And your assignment, as I understand it, from the Canadian Delhi, was to make a reserve estimate of every field in the Province?

A Well, it was never in so many words.

Q Well, that is what you said earlier?

A Essentially. We took the report of the Board and the general hearing reports to see what has been the scope, and we attempted then, in our own mind, to set up the entire picture.

Q When you are speaking of the general hearing report, you are speaking of the reports of the various companies?

A Yes, sir.

Q Not the reports of the Board?

A Yes, sir, that is true, of the companies and the Interim Report of the Board.

Q Which was dated, I think, at least, the reserves were ascertained by them as at January 1st, 1951?

A That is correct. Our initial hearing was set for some time in January, so that we then expanded the work when the time for the hearing was advanced, or set back.

Q And I suppose actually this was a big task, and you were not finished with the work in January, I presume?

A Yes, sir, that is very true.

A Now,you have, I presume, read the application of the Canadian Delhi Company to this Board?

A Yes, sir.

Q You are familiar with it?

A Well, I have read it. There are many details with which I am not, perhaps, familiar.

Q It is dated the 29th of September, I think, 1950, that is the copy I have, and I presume that is correct, so that you were engaged at that time?

A Well, actually prior.

Q Prior to that?

A I think so.

Q Yes?

A The date I am not positive of. We had discussions with Mr. Schultz in September and perhaps slightly earlier, but September was an effective time.

Q That application, paragraph 11, on page 4, says,-

> "The firm of Link & Nauss has been associated with the applicant in preparing the scientific studies necessary to this application, and to advise the applicant on the geological and engineering matters arising herein."

A That was the situation, I suppose, at some stage. That was with regard to all of the preliminary work prior to the advance of that application to the Board.

Q And there is attached to the application, as part of it, apparently, a report on natural gas in the Prairie Provinces by Link & Nauss, the then advisors on geological and engineering matters, which is dated September 27th, 1950?

A That is correct.

Q You read it?

A Yes, sir.

Q And you are familiar with it?

A Yes, sir.

Q Now, that sets out,perhaps, what can be described as a summary of the reserves as ascertained by Dr. Hume and his assistants, I think, as at the time of the summary in the summer of 1950. You recall that?

A I believe so. I believe the Link & Nauss work was a summary of the Hume Report, or a breakdown of it.

Q At least the earlier part of it?

A Yes, sir.

Q And the figure put forward there from Dr. Hume's Report was 7 trillion, 30.6 billion, which included a very small amount of gas in the Province of Saskatchewan, so that perhaps we can say 7 trillion, and in the Link & Nauss statement appears this sentence at page 3, -

> "The amount of this gas that would be recoverable economically is estimated to be 80% or a total of about 5.6 trillion",

you recall that?

A I do not recall it, but I assume that is correct.

Q I suppose you can accept my statement, I am reading from the application?

A Yes, sir.

Q Now, your estimate of the recoverable reserves, or the gas available for sale, perhaps, as you describe it, as at August 1st, 1951, is roughly 8.4 trillion?

A For the Province.

Q For the Province?

A Yes, sir.

Q Mr.Dougherty, you would not suggest, would you, that since January 1st, 1951, the recoverable reserves of this Province available for sale, has increased by the difference between 5.6 trillion and 8.4 trillion, would you?

A No, sir. That is comparing their estimate with our estimate.

Q I am not attempting to compare it at the moment?

A Oh, I see.

Q I am asking you whether, I am suggesting that you would not suggest that since January 1st, 1951, the recoverable reserves available for sale have increased by the difference of 2.8 trillion cubic feet?

A No, I would say the estimates have increased.

Q The estimates have?

A The estimates have increased.

Q But you would not suggest that the recoverable reserves for sale have increased in that period by 2.8 trillion?

A No.

Q No?

A Not from our work.

Q But you would agree that there has been a substantial increase since January 1st, 1951, in recoverable reserves available for sale in this Province, wouldn't you?

A That is correct. We so show it, that exhibit of ours.

Q Your report, the various volumes of it, bears the statement upon the cover of each of them, I think, there is a reference to the annual gas reserves in each case, and the statement appears in each case as of January 1st, 1951?

A That is correct.

Q Well, now, tell me in Volume 3, you show the Provincial reserves as at April 15th, 1951, and as at August 1st, 1951?

A I explained that, I believe, in the Edmonton Hearing.

Q I was not there.

MR. C. E. SMITH: He uses the word "supplemental" in Volume 3 anyway.

MR.PORTER: I think perhaps there could be a misunderstanding, based on those figures, because in the opening paragraph of Exhibit 10, just opposite the flyleaf, the statement is made that the estimate is made as at January, 1951, but the estimates contained in this report are based on data available as at August 1st, 1951.

A I might explain that to this extent...

Q I think you should.

A ...we wished to have all the new fields and developments up to as late a date as possible, but there is a lag in the reporting of production from producing fields, therefore, we left the subtraction of the accumulated production in producing fields as of January 1st, and there were, or since there were different fields developed during the year 1951, we would have, perhaps, six months' production in one field and three months in another, and in general the fields added in there from the period between April 15th and August 1st were new fields, in which there was no production, so that essentially there is no violation of any reserve estimation in any detail.

Q MR. S.B. SMITH: Well, perhaps I am not understanding

this correctly, Mr.Dougherty, but according to Exhibit No. 4, which I think is Volume 1, you show natural gas reserves available for sale as totalling 7 trillion, 878 billion, 497 million, don't you?

A Yes, sir.

Q That is provincially?

A That is correct.

Q 7 trillion, 878 billion, 497 million?

A Yes.

Q And in Exhibit 10 under the heading also of "Provincial Reserves", you show available for sale as of April 15th, 1951, 7 billion, 885 trillion - no, 7 trillion, 885 billion, 499 million?

A That is correct. We have a number of arithmetical errors which we wish to correct.

Q But those are substantially the same figures?

A Yes.

Q And in Exhibit 10 they are stated to be as of April 15th, 1951?

A That is correct.

Q Well, are they as of April 15th,1951?

A They are estimates of data, from data available as of April 15th, 1951, with cumulative production subtracted from producing fields as of January 1st, 1951.

Q So that they are actually computations of reserves as of April 15th, 1951?

A They are composite. In other words, for producing fields the estimate is on the nose as of January 1st, 1951.

Q Yes?

A For new fields and extensions, etc., the data available

is as of April 15th, since there was no cumulative production with regard to it.

Q Now, can you tell me this, in your report,your reports or these exhibits, the reserves computed by you appear initially as at January 1st, 1951, the Alberta reserves?

A Yes, sir. The reserve estimates are as of January 1st, 1951, with data available to April 15th. The producing fields are accurate to January 1st, 1951. New fields which were drilling at the time and discovered in the interim period, say, fromthe middle of 1950 to April 15th, having no production, were estimated as to the ultimate recovery with appropriate deductions, so that our viewpoint is that it is essentially January 1, 1951, for all fields, if there was no difference, or if there was any difference, it would be on the order of 1/1000 of 1%.

(Go to page 576)

Q Now, can you give me the difference between April 15th, 1951, and January 1st, 1951? Does that appear in your report?

A No, sir, because our estimate was of April 15th, 1951, with production subtracted to January 1st, 1951, the nearest practical date for the subtraction of production. There is a two to three months' lag in production statistics.

Q Now, of course, you are aware that this Board had before it various reports which I think you have referred to before you undertook your study, your investigation, and according to the Board's reports the various estimates given by the companies were Westcoast Transmission 7 trillion 23 billion; by Northwest Natural Gas Company 5 trillion, 6 billion; by Prairie Pipe Lines 4 trillion 684 billion; by Western Pipe Lines 5 trillion 614 billion; by McColl-Frontenac and Union, 6 trillion 284 billion; and by Mr. Leisemer, the Board's engineer, 3 trillion 635 billion. You are familiar with those figures and the reports in which those figures appear?

A Yes, sir.

Q And having heard that evidence, the Board found established reserves for the Province of Alberta for general use, including local use, and excluding also the gas beyond economical reach, a figure of 4 trillion 57 billion?

A Yes, sir.

Q As of January 1st, 1951?

A Yes, sir.

Q Now, you were not represented and did not take part,

I believe, in the Joint Hearing held in the fall of 1950?

A That is correct.

Q You are, I have no doubt, familiar with paragraph 13 of the Board's recommendations and conclusions which is as follows:

> "While the Board does not recommend export at this time, it believes that with the further development of established reserves and the development of promising strikes, the situation could change rapidly whereby export could be permitted. This, in the opinion of the Board, would be in the best interests of the Province and of Canada."

My understanding, Mr. Dougherty, of the nature of the Hearing upon which we are engaged now is that it is an enquiry as to the development of established reserves since the 1st of January 1951?

A That is not my understanding.

Q I see. Well, if I am right in that, then your and my understanding is obviously quite different?

A Well, may I make an explanation of my understanding?

Q Yes, certainly.

A The application of Canadian Delhi was a new application after the date, or roughly after the date of the general Hearing. The date was set some time in January, later advanced or set back to May, early in May, in Edmonton, as the original application of Canadian Delhi, which under the rules of the general application by the parties was to make an estimate of the reserves of the Province of Alberta without specification as to date.

The date to which you wanted to carry it down was your prerogative, I presume. Therefore, in Edmonton we held the first portion of the case in chief of Canadian Delhi and Trans-Canada. At the conclusion of that, that Hearing was recessed to this date for cross-examination of that initial case, plus additional data if we so wished to bring it up to date, therefore I do not concur with your opinion.

Q Yes. What you are suggesting, I take it, is that you, not having been in the Hearings in 1950, but having at that time filed your application, not having taken part in the Joint Hearing, that you built your report on reserves from the bottom upwards quite independently of any findings of the Board as of January 1st, 1951?

A Yes, all of our work is always independent of anyone else.

Q That may well be. You would not go so far as to suggest that other applicants might be bound by the findings of the Board as of January 1st, 1951, but that your company was not bound by it? You would not go that far?

MR. PORTER: Perhaps my learned friend could ask me that question.

MR. S.B. SMITH: I am not questioning Mr. Porter at the moment. If the witness does not -

MR. PORTER: I advise him not to trespass on the area in which I earn my fee.

MR. C.E. SMITH: Glad you said "earn", anyway.

MR. S.B. SMITH: Now, Mr. Dougherty, your report does not, as I understand it, give the additional reserves established in January 1st, 1951?

A No, sir. I think that could be pulled out if you would care to go to the trouble.

Q You are not suggesting that I pull it out?

A I would like to finish my answer, please.

Q I am sorry.

A Because all of the fields are set up by dates on these sheets, the date of discovery. It would be a relatively simple matter for you to pull them out and make a computation of your own. We frankly were not particularly interested in it. That was not our province, as I interpret it.

Q Now, I am going to ask you some further questions about the Board's report. You will recall that at page 47 of the report the Board stated:

"An examination of the established reserves listed in Table I indicates that the following might be considered physically available,"

and there they are speaking of the Edmonton system?

A Yes.

Q They list Bon Accord, Excelsior, Golden Spike, Joseph Lake, Legal, Morinville, Picardville, Provost and Redwater. I quite understand that you, of course, have no formal dedication of any field and you do not really claim any, as I understood your answers the other day. I would like you to tell me from what ones of the fields I have just read to you you propose tentatively to take gas for the requirements of the Delhi Company?

A Would you read that list again, please?

Q Bon Accord, Excelsior, Golden Spike, Joseph Lake, Legal,

Morinville, Picardville, Provost, Redwater.

A We do not propose to take from Redwater, Joseph Lake or Golden Spike. I believe all of the others.

Q All the others you do propose?

A Yes, in our initial tentative plan of the pipeline system.

Q Yes, and that is the only plan that you have put forward so far, that the Delhi Company has put forward before this Board?

A Quite correct, yes.

Q Then if I may go to page 45, the Board says:

"Looking to other areas of established reserves in the Southern part of the Province, the following suggest themselves."

They are there speaking of the Calgary system?

A Yes, sir.

Q The fields are Black Butte, Manyberries, Princess-Patricia, Pendent d'Oreille, Pincher Creek, Smith Coulee. You recall that?

A Yes.

Q Now, I think probably you will agree that Black Butte, Manyberries and Smith Coulee, that is, the Pakowki Lake field, are now for practical purposes eliminated or we can probably so consider them?

A For 5 years.

Q And at the present time probably you would say that is a problem of the Board's?

A I would say that is subject to change.

Q Subject to change. Do you in your tentative proposal take gas from Princess-Patricia?

A Yes, sir.

Q And from Pincher Creek?

A Yes, sir.

Q And at page 46, Mr. Dougherty, the Board said, a discussion with respect to Canadian Western Natural Gas system:

> "What seems to be needed is the development of some further dry gas reserves, the planning of the future peak sharing storage project, and the integration of the dry gas reserves, the storage scheme and Pincher Creek to meet jointly the requirements of the C.W.N.G. system and some export market proportionate to the increase in reserves."

Do you recall that?

A Was that storage in Pincher Creek?

Q I will read it again to you:

> "What seems to be needed is the development of some further dry gas reserves, the planning of the future peak sharing storage project, and the integration of the dry gas reserves, the storage scheme and Pincher Creek to meet jointly the requirements of the C.W.N.G. system and some export market proportionate to the increase in reserves."

A I understand it now. I believe you left the "and" out,

> "the storage scheme and Pincher Creek".

That is where I was not quite clear. Yes, I am aware of that paragraph.

Q Does your tentative proposed plan fit the requirements if those are the requirements in that paragraph?

A We were setting up our work on the list of requirements set up by the Board on the initial application, of which I have a copy. I do not know whether it is the same as this or not.

Q I do not think it is.

A I do not think these details were in it.

Q This is the Board's finding, the interim report.

A We attempted to follow that since it was directed specifically in the application by Canadian Delhi dated September 29th, 1950, and it is far more general and far more reaching in scope than this paragraph, and we in our work have attempted a study on as broad a scale as possible since the details are subject to change almost at any time, as the Board expressed in their interim report, the passage of time and additional developments.

Q MR. PORTER: Perhaps if I might just, for the purposes of the record, say that the date of that letter is the 2nd of October?

A Yes, sir.

Q 1950?

A Yes, sir.

Q Yes, I will give it to you and it is from the Board to Mr. Frank Schultz.

Q MR. S.B. SMITH: In any event, Mr. Dougherty, your plan or that advanced by the company you are representing here does not provide for the use of Pincher Creek jointly to assist in meeting the requirements of the C.W.N.G. system and some export market, does it?

A No. That is the detail which we have considered as being a mechanical problem once the whole problem of export in the broad sense is decided.

Q Of course, you have got to get your gas somewhere?

A Yes, sir.

Q And you proposed in this instance to take so much gas from Pincher Creek?

A I think every applicant is taking gas from Pincher Creek, that is true.

Q And census division No. 2, according to your report, is gas available for sale as of August 1st, 1951, 1 trillion, 515 billion 247 million, and your proposal is that there be available for sale for the proposed gas line, export line of Trans-Canada Pipe Lines Limited, from that census division, 1 trillion 543 billion 310 million, the exact amount?

A Yes, sir.

Q You propose to take the whole of the Pincher Creek supply of gas in this tentative proposal of yours?

A No, sir. There is an availability study which Mr. Trostel will put on, and on which I think the volumes are somewhat different. This is the total volume out of the total reserves available for sale. I do not have in mind what the total volume is.

Q In any event, according to this sheet headed, "Summary Natural Gas Reserves of the Proposed Gas Supply Fields of Trans-Canada Limited", taken from your volume No. 3 under the heading, "Provincial Reserves", you do show available for sale, and that means the sale to you, I take it?

A Or anyone.

Q Well, it is headed, "Summary Natural Gas Reserves of the Proposed Gas Supply Fields of Trans-Canada Pipelines Limited". Does it mean what it says?

A All those are subject to limitation. There are no dedications.

Q I understand what you said, and you said it very clearly, and I am not suggesting there is any dedication at all.

A Yes, sir.

Q And in census division No. 3, which according to your report has a total supply of gas available for sale of 1 trillion 515 billion 247 million, your sheet shows that your plan would take 577 billion 631 million?

A Yes, sir, that is correct.

(Go to page 585)

Q Division No. 5 where you have a total available for sale of 576 billion 985 million, your plan proposes that your company takes 496 billion 40 million?

A Yes, sir.

Q And in Division No. 7 in which you show the total supplies available for sale of 258 billion 533 million you propose to take 237 billion 403 million?

A That is correct.

Q And Division No. 8 where you show gas available for sale of 105 billion 850 million, you propose to take for your system 65 billion 691 million?

A That is correct.

Q And in Division No. 11 where you show gas available for sale of 838 billion 848 million, you propose to take for your system 462 billion 262 million?

A That is correct, yes, sir.

Q And in Division No. 14 where you show supplies available for sale of 560 billion 348 million you propose to take for your system 449 billion 609 million?

A Yes, sir.

Q And in Census Division 16 where you show supplies available for sale of 638 billion 140 million you propose to take for your system 585 billion 144 million?

A Yes, sir.

Q That is all, thank you.

THE CHAIRMAN: Any further questions?

MR. MARTLAND: I have one or two questions.

MR. S. B. SMITH: I am sorry, there were one or two questions I wanted to ask you.

Q The Board in its report referred to Leduc-Woodbend as a supply source for the City of Edmonton, you will recall that?

A Yes, sir.

Q At page 30 of the report, and your proposed plan would take gas for export by Trans-Canada pipe lines from Leduc-Woodbend.

A Yes, sir. I do not remember offhand whether that referred to the reserves said to be, or set up in the Lower Cretaceous or not. My impression is it was restricted to the D2 gas cap, the D3 gas cap and the solution gas, since I do not remember any estimate of the Lower Cretaceous reserve.

Q We can ascertain that as we go along, in any event?

A I think so.

Q And your plan also proposes that gas be taken by Trans-Canada from the fields of Morinville and Picardville which are adjacent to Edmonton?

A Yes.

Q From the Princess Patricia area you propose that gas go into your system for export?

A Yes, sir. None of these fields have markets and part of the desire of Canadian Delhi and Trans-Canada Pipe Lines was to supply a market.

Q And you also proposed to take gas from Medicine Hat into your system for export?

A That is not specifically set out.

Q Well, it appears to follow, at least from that area?

A Not necessarily. However, the reserves are very large and there is a matter as to what proportion would be reserved for the City system and what for export.

Q I understand that. You had proposed to take gas from Census Division No. 3 in which Medicine Hat appears?

A Yes, the line runs pretty close to Medicine Hat.

Q And that is the field from which you proposed to take 577 billion 631 million feet?

A No, sir, it is out of Medicine Hat.

Q But it is from that Census Division?

A Yes, sir.

Q Thank you.

THE CHAIRMAN: Mr. Martland, would you rather wait until tomorrow morning, or can you finish your questioning very shortly?

MR. MARTLAND: I think I can probably finish in ten minutes.

THE CHAIRMAN: All right.

CROSS-EXAMINATION BY MR. MARTLAND:

Q Mr. Dougherty, I think you have before you the Board's report there, and I would ask you if you would mind turning to page 44, towards the bottom of that page, and you will recall that the Board at the time of the report found a deficiency for Canadian Western there over a 30-year period of 600 billion and suggested that in its opinion there would be required marketable gas of the order of 1100 to 1300 billion to meet the deliverability required in the 30-year period?

A Yes, sir.

Q Then if you will turn to the top of page 5, there was a suggestion by the Board on the basis of the evidence up

to that time that the fields from which that deficiency might perhaps be met, it gives the fields, that is, in the absence of something better or closer?

A What page, sir?

Q I think I said 5. It is page 45. There is a list of the fields there?

A Yes, sir.

Q I wonder if you would mind giving us your own estimate as to the gas available for sale for each of those particular fields? I realize that they are set out in your exhibits, but for the convenience of the record if we could have it?

A Black Butte, the first one on page 45, in the second paragraph, 65 billion 44 million.

Q Yes.

A Shall I round those off?

Q I think if we have them in billions the way that the Board has them?

A 65 billion.

Q Yes.

A Manyberries, the second field, 105 billion.

Q Yes?

A Princess Patricia is the catch-all area, and I am not sure what the composition of that is. I assume that would be the central part of Census Division 3.

Q I think that is so. The Board on page 23 said that it was an area difficult to define and included a number of small producing fields, and I think they have given a figure there, and I wondered if you could do the same

with regard to your own views?

A I would say for convenience that we use the figure shown for proposed gas supply fields of Trans-Canada Pipe Lines Limited.

Q Yes.

A In Census Division No. 3, which would approximate the Princess Patricia area.

Q And that would be what?

A 578 billion.

Q Yes.

A The Pendant d'Oreille field, or whatever it is called, in Census Division 1, 323 billion feet.

Q Yes?

A Pincher Creek, 1543 billion feet.

Q Yes?

A Smith Coulee, 5 billion feet.

Q I have not been adding those up but I take it that it would be an increase in your figures over those of the Board's in some substantial amount?

A Very substantially, yes, sir.

Q And then the Board, at the time of this report, referred to certain fields in respect of which at that time no figure was given. They are found on page 25 of the Board's report, Mr. Dougherty.

A Yes, sir.

Q And among those is Cessford, and you have given us information which you have about Cessford, and you have a fairly substantial estimate for that field?

A Yes, sir. That is perhaps 30% or more of what it is at

this instant, in view of the new wells that have been developed and we expect to bring them up to date.

Q At the moment then it would be what?

A Let me check. 423 billion. We would estimate as roughly 750 billion at this time.

Q And included in the Board's list of other gas occurrences is Many Islands Lake?

A Yes, sir.

Q Can you give us an estimate as to that, apart from Medicine Hat?

A We consider that part of the same reservoir.

Q I know you do.

A We have no break-down, but the added area by reason of the activities there, is on the order of several hundred billion, and we have made no estimate.

Q Would it be your opinion on the basis of your estimates, and on the basis of these fields with respect to which the Board did not give a figure, that there would now be something better than 1 trillion cubic feet of gas available in the southern part of the Province after providing for the requirements of Canadian Western?

A I would say that is an approximation. I have not made such a computation, but a very substantial volume, yes, sir.

Q Thank you.

THE CHAIRMAN: We will adjourn until tomorrow morning.

(Hearing adjourned until 9 A.M., September 20th, 1951.)

The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

Application for Permission to Remove or cause to be removed Natural Gas from the Province of Alberta, under the Provisions of the Gas Resources Preservation Act by Prairie Pipe Lines Limited.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session:

Volume_____